

299-W10-69 (A7159) Log Data Report

Borehole Information:

Borehole: 299-W10-204 (A7159)		Site: 216-T-7 Crib			
Coordinates (WA St Plane)		GWL¹ (ft): None	GWL Date: 05/31/06		
North (m)	East (m)	Drill Date	TOC Elevation	Total Depth (ft)	Type
136664.646	566694.125	08/47	675.56	138.0	Cable

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Steel	0	8 5/8	8	5/16	0	138

Borehole Notes:

The logging engineer measured the casing diameter using a caliper and steel tape. Logging data acquisition is referenced to the TOC which is at the ground surface. Water is inside the borehole at 134.8 ft. The water is likely the result of a poor casing cap seal at the ground surface that allows precipitation runoff to enter the borehole.

Logging Equipment Information:

Logging System: Gamma 4E	Type: SGLS (70%) SN: 34-TP4057A
Effective Calibration Date: 05/08/06	Calibration Reference: DOE-EM/GJ1199-2006
Logging Procedure: MAC-HGLP 1.6.5, Rev. 0	

Logging System: Gamma 4I	Type: Passive Neutron (PNLS) SN: U-1754
Effective Calibration Date: None required	Calibration Reference: None
Logging Procedure: MAC-HGLP 1.6.5, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3 Repeat	4 Repeat	
Date	05/31/06	06/01/06	06/01/06	06/01/06	
Logging Engineer	Spatz	Spatz	Spatz	Spatz	
Start Depth (ft)	0	64.0	85.0	39.0	
Finish Depth (ft)	65.0	134.0	100.0	46.0	
Count Time (sec)	100	100	100	400	
Live/Real	R	R	R	R	
Shield (Y/N)	N	N	N	N	
MSA Interval (ft)	1.0	1.0	1.0	1.0	
ft/min	N/A ²	N/A	N/A	N/A	
Pre-Verification	DEC51CAB	DEC71CAB	DEC71CAB	DEC71CAB	
Start File	DEC61000	DEC71000	DEC71071	DEC71087	
Finish File	DEC61065	DEC71070	DEC71086	DEC71101	
Post-Verification	DEC61CAA	DEC71CAA	DEC71CAA	DEC71CAA	
Depth Return Error (in.)	+ 1.0	N/A	N/A	- 1.0	
Comments	No fine-gain adjustment.	No fine-gain adjustment.	No fine-gain adjustment.	No fine-gain adjustment.	

Passive Neutron Logging System (PNLS) Log Run Information:

Log Run	5	4 Repeat			
Date	06/05/06	06/05/06			
Logging Engineer	Spatz	Spatz			
Start Depth (ft)	35.0	39.0			
Finish Depth (ft)	54.0	44.0			
Count Time (sec)	60	60			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	1.0	1.0			
ft/min	N/A	N/A			
Pre-Verification	DI372CAB	DI372CAB			
Start File	DI372000	DI372020			
Finish File	DI372019	DI372025			
Post-Verification	DI372CAA	DI372CAA			
Depth Return Error (in.)	N/A	N/A			
Comments	None	None			

Logging Operation Notes:

Logging was conducted with a centralizer on each sonde and measurements are referenced to top of casing.

Analysis Notes:

Analyst:	Henwood	Date:	10/10/06	Reference:	GJO-HGLP 1.6.3, Rev. 0
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Pre-run and post-run verifications for the logging systems were performed before and after the day's data acquisition. The acceptance criteria were met.

A casing correction for a 5/16-in. thick casing was applied to the SGLS data.

SGLS spectra were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Concentrations were calculated with an EXCEL worksheet template identified as G4Emay06.xls using an efficiency function and corrections for casing and dead time as determined from annual calibrations.

For purposes of this report the repeat data at 400 second counting times are included in the main log plots. The 100 second counting times are used as repeat data.

Results and Interpretations:

Manmade radionuclides detected in this borehole included ²³⁹Pu, ²⁴¹Am, ¹³⁷Cs, and ¹⁵⁴Eu,

Full energy peaks attributed to ²³⁹Pu are detected at 375.05 and 413.71 keV. The 375.05 keV gamma ray has a slightly higher yield and is used to assay the ²³⁹Pu. ²³⁹Pu is detected between 29 and 42 ft with a maximum concentration of approximately 29,000 pCi/g at 42 ft.

²⁴¹Am is detected from 39 to 44.5 ft with a maximum concentration of approximately 54,000 pCi/g. This assay should be considered qualitative. ²⁴¹Am is usually assayed using the 662.40 or 722.01 keV energy peaks. In this borehole, interferences are occurring from ¹³⁷Cs (661.66 keV) and ¹⁵⁴Eu (723.31 keV). The influence from ¹⁵⁴Eu was subtracted from the 722.01 ²⁴¹Am energy peak to determine the concentration of ²⁴¹Am.

Residual counts attributed to ²⁴¹Am in the 662 keV energy peak were subtracted to provide a ¹³⁷Cs assay. It is estimated the maximum ¹³⁷Cs concentration is approximately 0.25 pCi/g.

¹⁵⁴Eu concentrations were determined from the 1274.44 keV energy peak. The 723.31 ¹⁵⁴Eu gamma line is also observed in the spectra but exhibits less yield than the 1274.44 keV gamma line. ¹⁵⁴Eu is detected from 40 to 43 ft with a maximum concentration of 0.3 pCi/g.

Passive neutron logging was performed in the borehole. This logging method has been shown to be effective in qualitatively detecting zones of alpha-emitting contaminants from secondary neutron flux generated by the (α ,n) reaction and may indicate the presence of α -emitting nuclides, including transuranic

radionuclides, even where no gamma emissions are available for detection above the MDL. The passive neutron signal depends on the concentration of α sources, and also the concentrations of lighter elements such as N, O, F, Mg, Al, and Si which emit neutrons after alpha capture. The passive neutron log indicated a maximum count rate of approximately 0.1 counts per second (cps) at 40 ft. Although very small, the presence of any neutron flux is an indication of transuranic waste.

The SGLS repeat sections of natural gamma logs show good repeatability. The manmade radionuclides do not show repeatability. The data acquired at 400 second counting times at 0.5 ft intervals show more detections than the data acquired at 100 seconds at one ft intervals. The lack of detections in the 100 second data suggests the system is very near the minimum detection level at that counting time.

List of Log Plots:

Depth Reference is top of casing

Depth Scale - 20 ft/inch except for repeat logs

Manmade Radionuclide Plot

Natural Gamma Logs

Combination Plot (0-120 ft)

Combination Plot (110-230 ft)

Total Gamma, Dead Time, & Passive Neutron

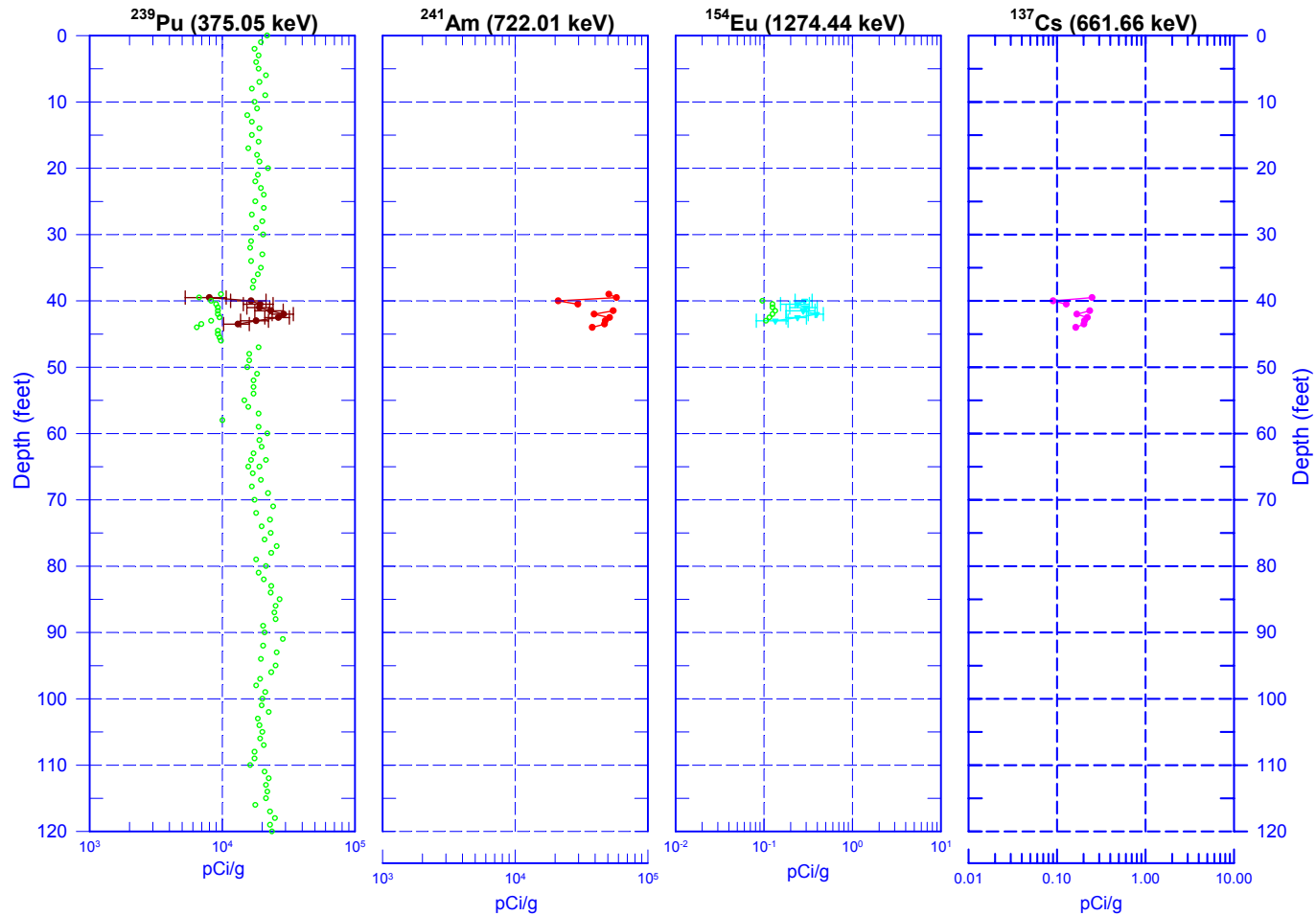
Repeat Section of Natural Gamma Logs (85-100 ft)

Repeat Section of Natural Gamma Logs (39-46 ft)

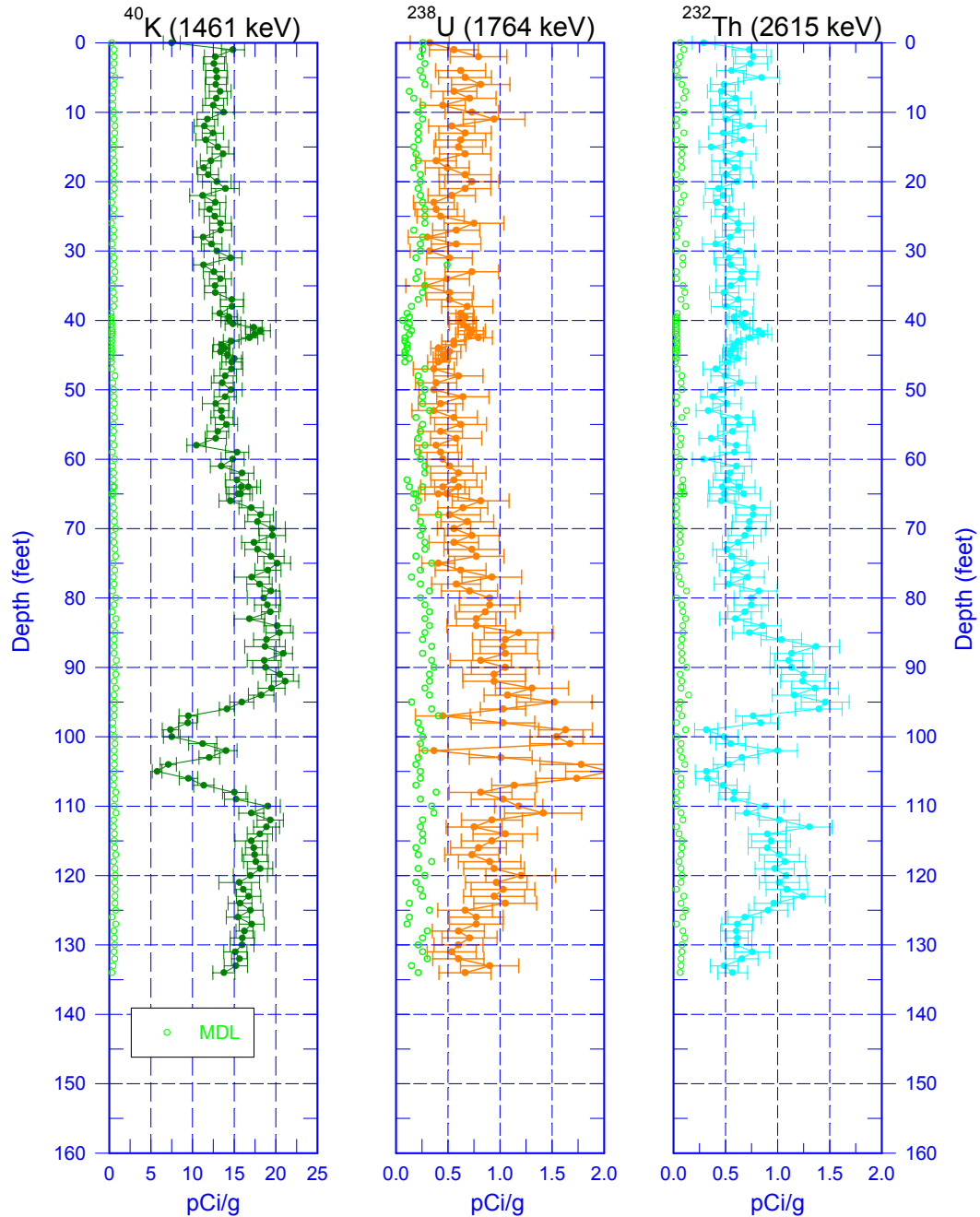
Repeat of Manmade Radionuclides

¹ GWL – groundwater level

299-W10-69 (A7159) Manmade Radionuclide Plot

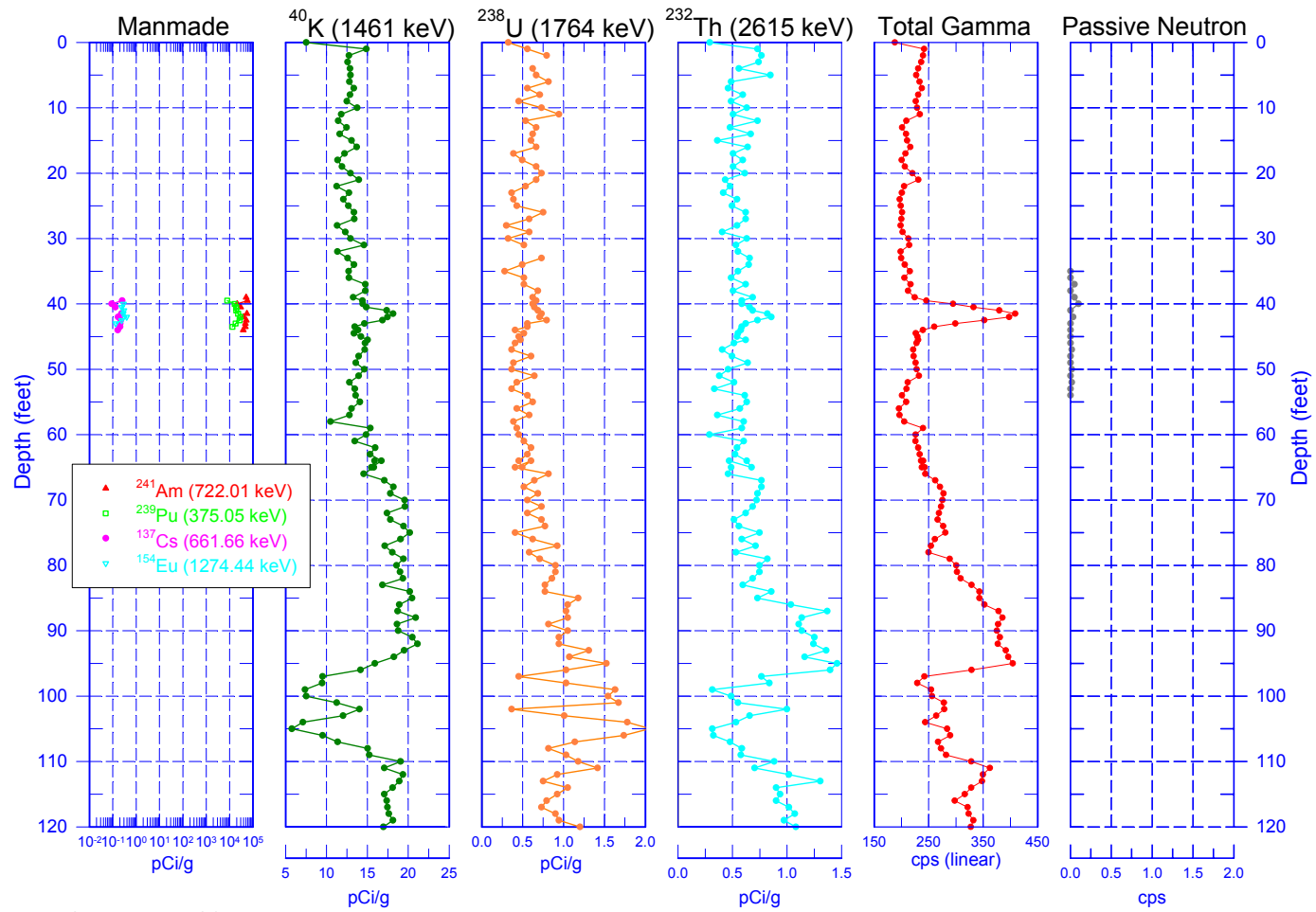


299-W10-69 (A7159) Natural Gamma Logs

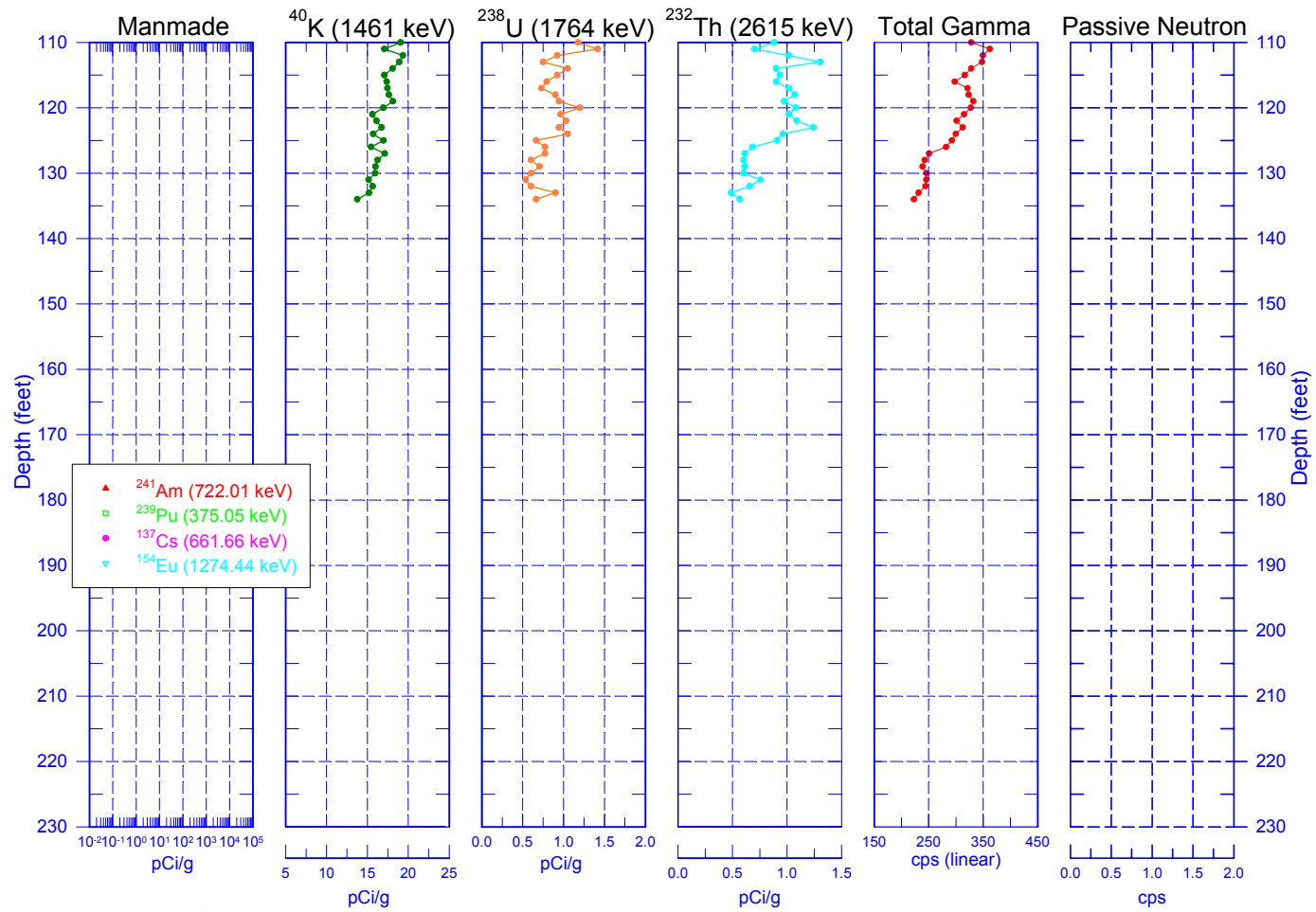


Zero Reference = Top of Casing

299-W10-69 (A7159) Combination Plot

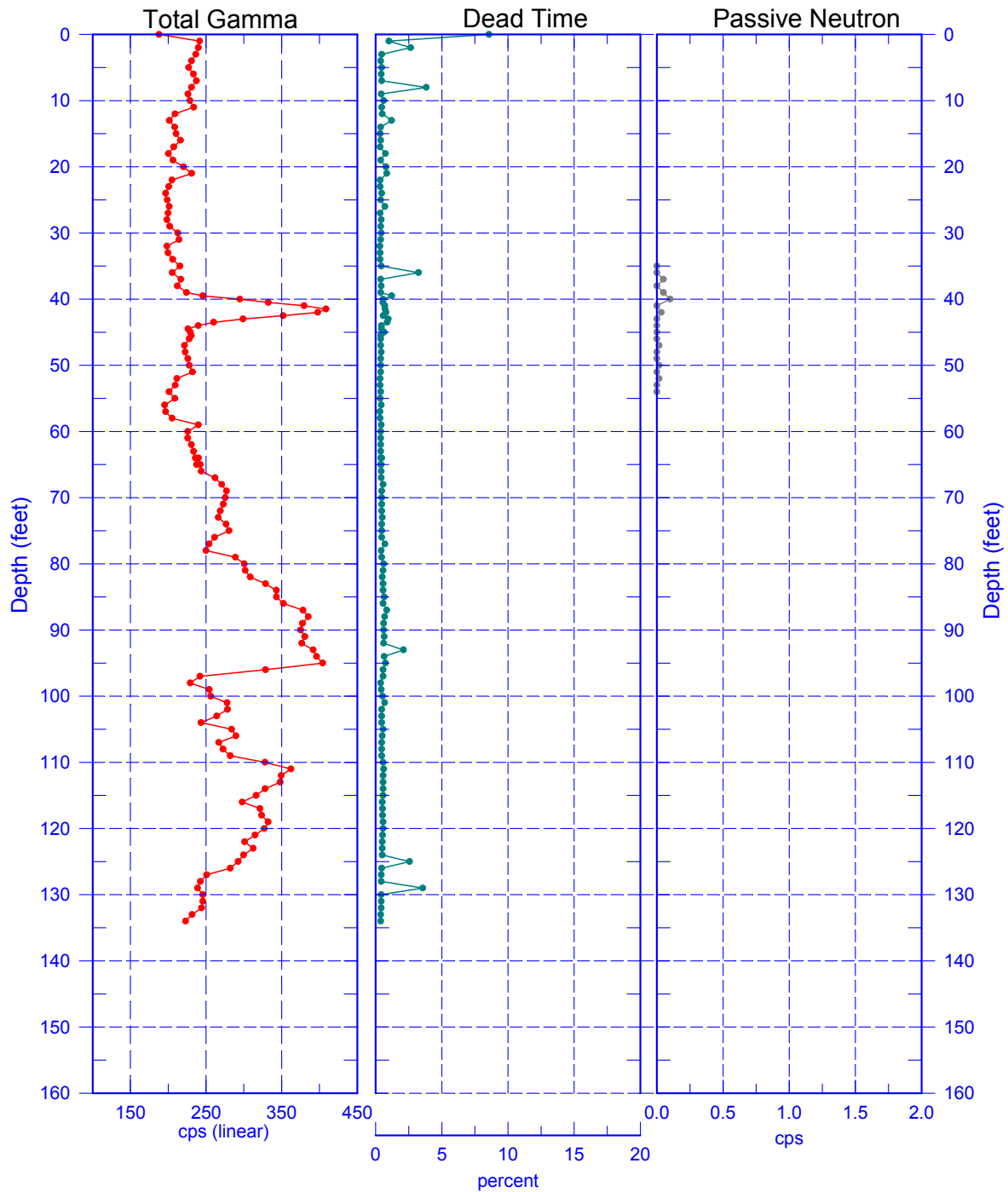


299-W10-69 (A7159) Combination Plot



299-W10-69 (A7159)

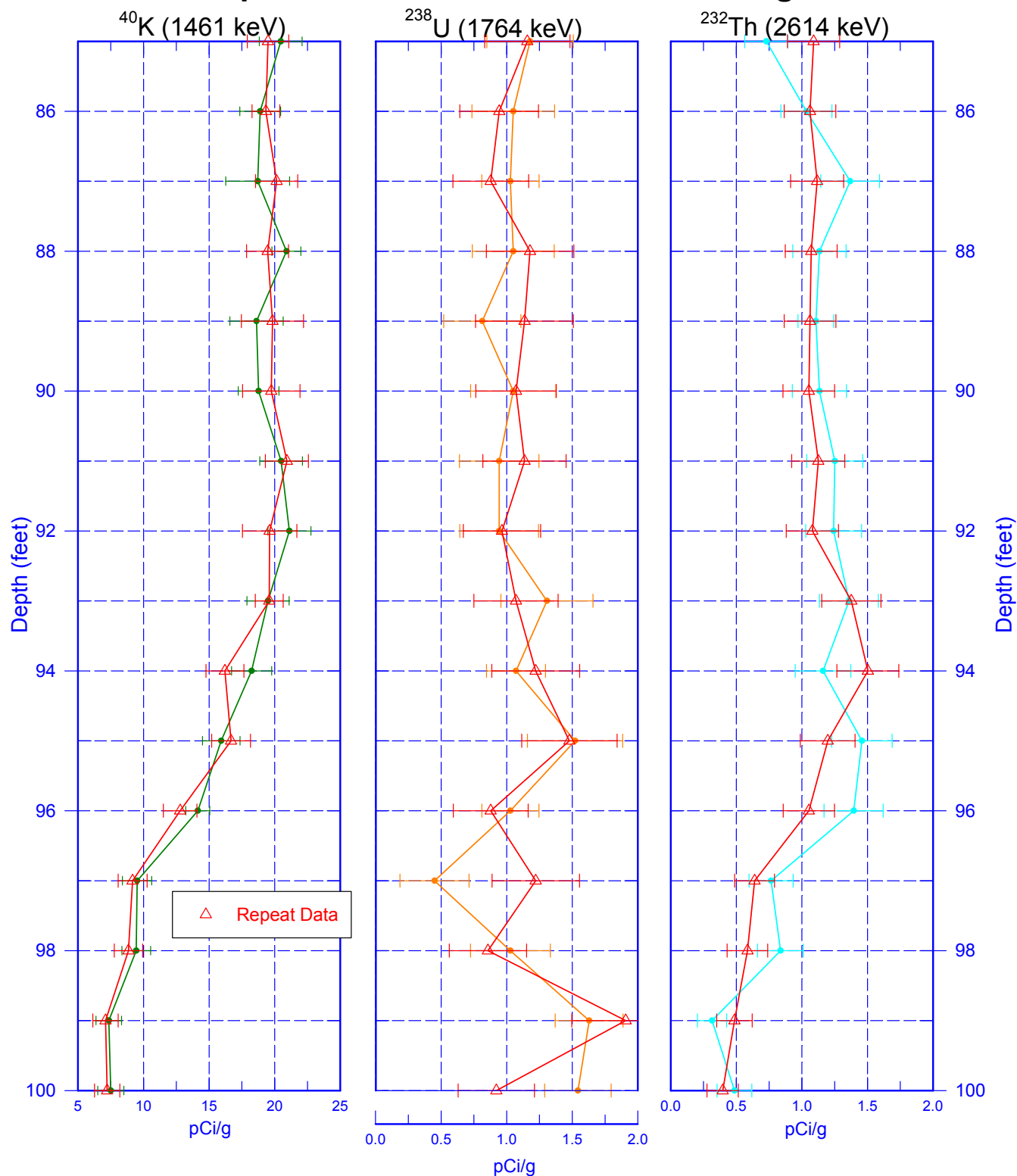
Total Gamma, Dead Time & Passive Neutron



Reference - Top of Casing

299-W10-69 (A7159)

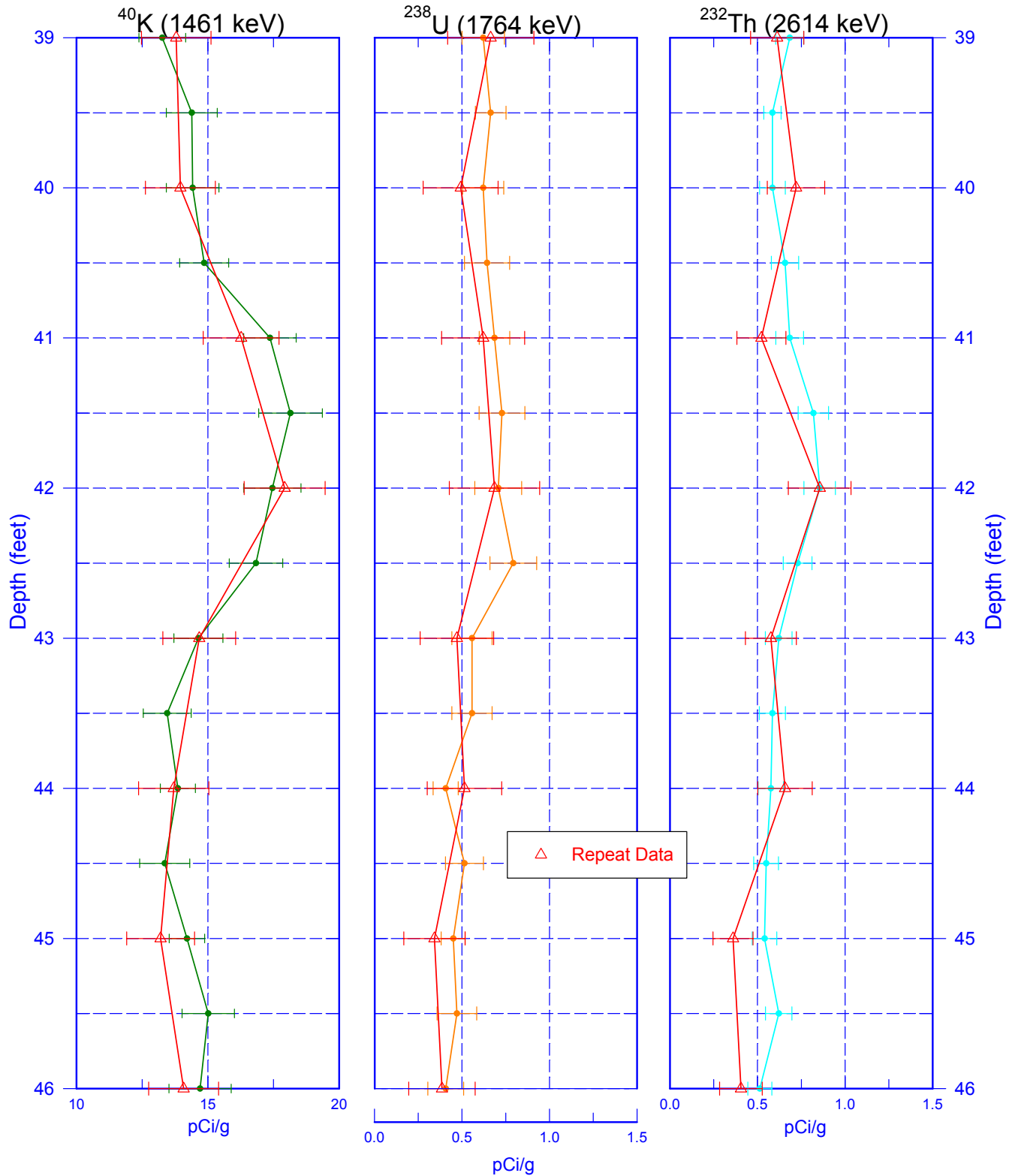
Repeat Section of Natural Gamma Logs



Zero Reference = Top of Casing

299-W10-69 (A7159)

Repeat Section of Natural Gamma Logs



Zero Reference = Top of Casing

299-W10-69 (A7159) Repeat of Manmade Radionuclides

